1165 Doppler Flow Wire Assessment In Coronary Disease

Wednesday, April 1, 1998, 9:00 a.m.–11:00 a.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 9:00 a.m.–10:00 a.m.

1165-59 Quantitative Relationship Between Coronary Microvascular Damage and Myocardial Viability Assessed by Doppler Guidewire

Y. Takano, S. Nanto, T. Ohara, T. Morozumi, H. Nakayama, J. Kotani, M. Kawabata, T. Watanabe, M. Fujita, K. Mizushige, S. Nagata. *Kansai Rosai Hospital, Amagasaki, Japan*

Background: Few quantitative data exist regarding the relationship between coronary microvascular damage and myocardial viability in myocardial infarction.

Methods: We simultaneously recorded coronary flow pattern in the anterior descending artery using Doppler guidewire and ostial pressure after 3 months of anteroseptal infarction in 46 pts (male/female: 32/14, mean age 61 years old). In all, no angiographical stenosis was observed due to successful recanalization. As index of coronary microvascular function, the instantaneous hyperemic coronary flow versus pressure slope index (FPI) was calculated as the slope of progressive diastolic velocity-pressure relation in the maximum hyperemia after intracoronary injection of adenosine triphosphate (50 ug). FPI is known to decrease with an increase in coronary resistance and has been reported to be less affected by loading conditions than coronary flow reserve. We quantitatively estimated thallium-201 myocardial uptake in LAD area using defect score (DS; 0-normal, 1-mild reduce, 2-reduce, 3-defect). The patients were classified two groups by DS: viability (+) as the group with high uptake of Tl (DS = 0 or 1) and viability (−) as that with low uptake (DS = 2 or 3). The FPI was compared with these two groups.

Results:

	Viability (+)	Viability (−)
FPI (cm/sec/mmHg)	1.99 ± 0.38	0.86 ± 0.39

(mean ± SD, $p < 0.05$)

The FPI was significantly reduced in the group of viability (−). Thus, the impairment of coronary microvascular function was well correlated to myocardial viability in infarct area.

Conclusion: The FPI can evaluate myocardial viability and is considered useful parameter to decide the revascularization of the patients with coronary heart disease.

1165-60 Doppler Flow Velocity Reserve Guided Coronary Interventions: The Concept of Intraindividual Reference Measurements

M. Haude, D. Baumgart, G. Caspari, J. Ge, F. Liu, R. Erbel. *Cardiology Department, University Essen, Germany*

Background: Coronary flow velocity ratio (CVR) assessed by intracoronary Doppler guide wires (Cardiometrics, Mountain View, USA) allows to estimate the functional result of a coronary intervention. Despite adequate postinterventional luminal widening CVR values increase to different levels.

Methods: Instead of using a general cut-off value for CVR we decided to guide our intervention by the individual measurement of CVR in a non-stenotic reference artery. To evaluate this strategy, we have measured CVR distal to the target lesion (CVRd) and in a reference vessel (CVRref) in 20 patients (pts) with LAD stenoses presenting no other risk factors which influence microvascular capacity (group 1), in 10 pts with LAD stenoses 1 to 3 months after anterior myocardial infarction (group 2) and in 15 pts with LAD stenoses presenting severe arterial hypertension, hyperlipidemia, diabetes mellitus and diffuse coronary disease (group 3). Measurements were repeated after PTCA and stenting. CVR was calculated as the ratio of hyperemic and baseline flow velocity before and after intracoronary injection of 18 µg adenosine.

Results:

	before PTCA	after PTCA	after stent	reference vessel
Group 1: CVR	1.3 ± 0.4	2.4 ± 0.6*	3.2 ± 0.6§	3.3 ± 0.4
CVRd ≥ CVRref	0/20 d	3/20	20/20	–
Group 2: CVR	1.3 ± 0.3	2.2 ± 0.5*	2.4 ± 0.3	3.4 ± 0.2
CVRd ≥ CVRref	0/10	3/10	5/10	–
Group 3: CVR	1.3 ± 0.3	2.0 ± 0.4*	2.4 ± 0.3	2.4 ± 0.4
CVRd ≥ CVRref	0/15	5/15	15/15	–

*: $p < 0.01$ versus before PTCA; §: $p < 0.01$ versus after PTCA

Conclusion: Guidance of CVRd by CVRref allows to tailor the functional result of a coronary intervention. This approach can be cost-effective since unnecessary elective stenting can be avoided. In pts with MI the postinterventional CVRd remains unpredictable.

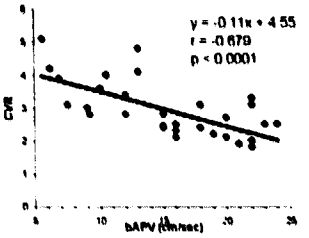
1165-61 Baseline Average Peak Velocity Should Be Considered for Interpretation of Coronary Flow Velocity Measurements

H. Wieneke, M. Haude, D. Baumgart, C. Altmann, F. Liu, D. Weige, C. von Birgelen, R. Erbel. *Department of Cardiology, University Hospital Essen, Germany*

Background: Previous experimental studies have demonstrated intra-individual variation of coronary flow velocity reserve (CVR) with baseline average peak velocity (bAPV), heart rate (HR), blood pressure (BP), and left ventricular preload (LVEDP). However, in clinical practice CVR is not corrected for these parameters.

Methods: To examine the potential influence of these hemodynamic parameters on CVR, we used intracoronary Doppler and examined a consecutive series of 32 patients with typical angina, positive myocardial perfusion imaging, and absence of significant luminal narrowing. Flow velocity measurements were performed in left anterior descending coronary arteries and CVR was calculated as the ratio of hyperemic APV (intracoronary bolus of adenosine) and bAPV.

Results: CVR was 2.9 ± 0.85 (range: 1.8–5.0). Increase in bAPV was associated with a significant reduction in CVR ($p < 0.0001$, figure), whereas CVR did not show a relation with HR, BP, and LVEDP.



Conclusion: These data underline the importance of bAPV as a significant determinant of CVR. Thus, bAPV should be considered when interpreting low CVR measurements.

1165-62 The Absolute and Relative Coronary Flow Velocity Reserve After Lumen Enlargement by Ultrasound-guided Balloon Angioplasty and Stent Implantation

R.A.M. van Liebergen, J.J. Piek, R.J.G. Peters, K.T. Koch, R.J. de Winter, C.E. Schotborgh. *Academic Medical Center, Amsterdam, The Netherlands*

Background: Many studies demonstrated an improvement in coronary flow reserve (CFR) immediately after stenting of a dilated lesion. We evaluated the relation between better epicardial lumen enlargement after coronary angioplasty and CFR

Methods: We studied 20 patients with 1-vessel disease and normal left ventricular function before and after standard balloon angioplasty, and following intravascular ultrasound (IVUS)-guided balloon angioplasty and stent-implantation. CFR was calculated by the ratio of the hyperemic/baseline average peak velocity determined distal of the treated lesion using a 0.014" Doppler guide wire. The rCFR was defined as the ratio between the CFR and the CFR of the normal reference coronary artery. Percent diameter stenosis (%DS) and minimal lumen diameter (MLD) were determined by quantitative coronary angiography. IVUS-guided balloon angioplasty and coronary stenting were performed using the mean of the maximal lumen diameter and the maximal vessel diameter of the angiographic normal reference segment.

Results: IVUS-guided balloon angioplasty was performed with larger sized (1.0 ± 0.5 mm) balloons. Dissections occurred after standard PTCA in 4 patients and after IVUS guided PTCA in 2 patients. %DS and MLD improved linear after standard, IVUS guided balloon angioplasty and after stent placement (Table). CFR and rCFR improved only after standard PTCA (Table, both $P < 0.0001$).

	%DS	MLD (mm)	CFR	rCFR
Before PTCA	69 ± 12	1.05 ± 0.38	1.5 ± 0.6	0.48 ± 0.18
After standard PTCA	34 ± 13	2.19 ± 0.35	2.6 ± 0.6	0.83 ± 0.22
After IVUS-guided PTCA	19 ± 22	2.79 ± 0.54	2.7 ± 0.8	0.87 ± 0.23
After stent placement	−8 ± 20	3.87 ± 0.49	2.8 ± 1.1	0.88 ± 0.26

Conclusions: Further lumen enlargement after standard balloon angioplasty does not result in an improvement of the absolute or relative coronary flow velocity reserve.